Relief of obstructive pelvic venous symptoms with endoluminal stenting

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Purpose: **To select patients for percutaneous transluminal stenting of chronic postthrombotic pelvic venous obstructions (CPPVO), we evaluated the clinical symptoms in a cohort of candidates and in a series of successfully treated patients.**
Methods: **The symptoms of 42 patients (39 women) with CPPVO (38 left iliac; average history, 18 years) were recorded, and the venous anatomy was studied by means of duplex scanning, subtraction venography, and computed tomography or magnetic resonance imaging. Successfully stented patients were controlled by means of duplex scanning and assessment of symptoms.**
Results: **The typical symptoms of CPPVO were reported spontaneously by 24% of patients and uncovered by means of a targeted interview in an additional 47%. Of 42 patients, 15 had venous claudication, four had neurogenic claudication (caused by dilated veins in the spinal canal that arise from the collateral circulation), and 11 had both symptoms. Twelve patients had no specific symptoms.**
Placement of a stent was found to be technically feasible in 25 patients (60%), was attempted in 14 patients, and was primarily successful in 12 patients. One stent occluded within the first week. All other stents were fully patent after a mean of 15 months (range, 1 to 43 months). Satisfaction was high in the patients who had the typical symptoms, but low in those who lacked them.
Conclusion: **Venous claudication and neurogenic claudication caused by venous collaterals in the spinal canal are typical clinical features of CPPVO. We recommend searching for these symptoms, because recanalization by means of stenting is often feasible and rewarding. (J Vasc Surg 1999;29:484-8.)**

In 1988, we published a novel clinical entity as a case report: neurogenic claudication ensuing as a consequence of pelvic vein occlusion. Distended and tortuous veins in the spinal canal that arose from the collateral circulation was shown by means of computed tomography (CT) and digital venography scans obtained from a patient with pelvic venous obstruction and neurogenic claudication. We hypothesized that these veins would swell during leg exertion and thus provoke symptoms of a narrow spinal canal.[1] Our interest in this clinical syndrome was raised again when it became evident that chronic postthrombotic pelvic venous obstructions (CPPVO) can be eliminated with the placement of endoluminal stents.[2] To select candidates for such intervention, we examined 42 patients with CPPVO for the presence of venous claudication, neurogenic claudication, or both and attempted stenting in a series of 14 patients with suitable anatomy.

From the Angio Bellaria, Center for Vascular Diseases.
Presented at the Tenth Annual Meeting of the American Venous Forum, Lake Buena Vista, Fla, Feb 18–21, 1998.
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0741-5214/99/$8.00 + 0 **24/1/94367**

PATIENTS AND METHODS

The diagnosis of CPPVO was made in 42 patients. The demographic data are given in Table I. A targeted history was taken to unmask eventual symptoms considered typical and specific of CPPVO[3]: venous claudication (provoked by congestion of muscles resulting from insufficient drainage) and neurogenic claudication (caused by occupation of space in the spinal canal by distended veins that arise from the collateral circulation). The features of the clinical syndromes are detailed in Table II. The morphology of the obstruction and collateral pathway was studied by means of subtraction venography and duplex scanning. CT or magnetic resonance imaging (MRI) of the lumbar spine, subtraction venography of the lumbovertebral region with oblique projections, or both were performed in patients in whom neurogenic claudication was suspected. A venous origin of neurogenic claudication

was assumed when dilated veins were identified by means of MRI, contrast enhanced CT, or subtraction venography scans, or when a native CT scan did not reveal another reason for the symptoms. Typical images of spinal MRI and digital venography are shown in Figs 1 and 2.

Stenting was considered clinically suitable when the patient had at least one of the typical symptoms and technically feasible when the left external iliac vein (EIV) was patent enough to allow the insertion of a probing catheter. Nine patients had occlusions of the common iliac vein (CIV), and five had tight stenoses.

In addition, the EIV was occluded in two patients, severely stenosed (less than 4 mm lumen diameter) in five patients, and affected to a lesser degree in the remaining seven patients. The naming of the veins and the measuring of the length of the segments was felt to be inexact, because the internal iliac vein (IIV) was not opacified in most cases and measuring catheters were not used. The stenoses and/or occlusions were easily negotiated with a gel-coated guide wire in 10 cases. In two cases, a 1.5 mm J-guide was forced through the occlusion with the help of a straight probing catheter. In two cases, the long occlusions involving the EIV could not be passed. A Wallstent with a diameter of 12 to 16 mm and a length of 35 to 55 mm was placed from below, with its cranial end exactly at the caval junction. A second stent was placed distally in one case. The stents were expanded fully with balloon catheters inserted from below. Vein segments between the distal end of the stent and the introducer sheath were dilated when the vessel diameter was less than 10 mm. In five cases, balloon catheters were also introduced from above via the transbrachial route. This approach prevented eventual slipping of the stent into the caval vein, allowed the use of the kissing balloon technique, and permitted dilatation of the EIV down to the femoral junction.

Anticoagulant treatment included dalteparin (200 IU/kg body weight, once daily) for 1 week and phenprocoumon (target international normalized ratio, 2.4). At follow-up, five patients were still undergoing anticoagulant treatment. It had been stopped in the other six patients five to 12 months after stenting and five to 26 months before follow-up.

Follow-up examinations with duplex scanning (with color coding and power mode) and visual analog scales to assess the symptoms were done in all 11 patients who had a patent stent 1 week after deployment.

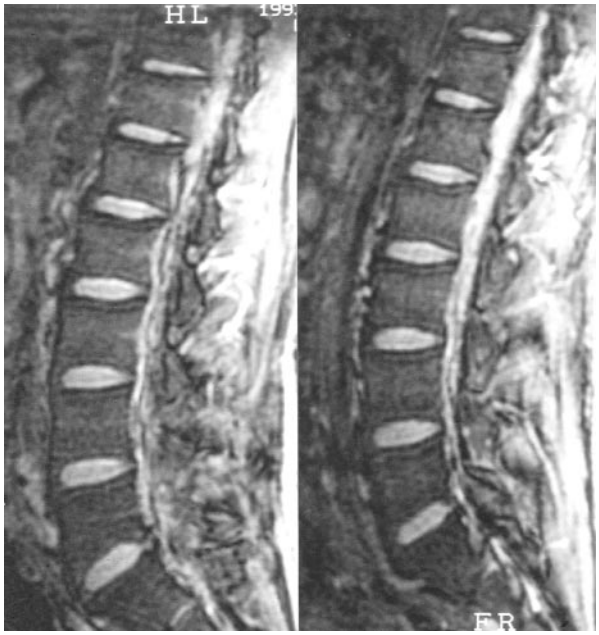

Fig 1. Magnetic resonance imaging scans of a patient with chronic postthrombotic pelvic venous obstruction. Parasagittal magnetic resonance images of the lumbovertebral region were obtained from a patient who experienced iliacofemoral thrombosis 11 years earlier and suffered from symptoms of a narrow spinal canal since then. Dilated and slightly tortuous veins are present in the spinal canal. Stenting of the completely occluded pelvic axis was not feasible.

RESULTS

Symptoms typical of CPPVO were ascertained in 30 of 42 patients (Table III): venous claudication in 15 patients, neurogenic claudication in four patients, and both symptoms in 11 patients. Twelve patients had no symptoms related to their CPPVO. The placement of an endoluminal stent was deemed to be possibly technically feasible in 25 patients (60%) by means of morphologic work-up. Of these patients, 17 (68%) also had the typical symptoms and were therefore judged clinically suitable. Five anatomically and clinically suitable patients declined stenting, and two patients with suitable anatomy were stented despite a lack of typical symptoms. Stenting was relatively easy to perform and primarily successful in 12 of 14 attempts. The procedure failed in the two patients with long occlusions involving the EIV. Deployment of the stent and balloon dilatation caused some pain in most patients and required the administration of intravenous morphine in three cases. No untoward events were observed. Reocclusion occurred in one patient within the first week, despite correct anticoag-

Fig 2. Venographic study in a patient with chronic postthrombotic pelvic venous obstruction. Digital venography was performed in a patient who experienced left-sided pelvic and leg vein thrombosis 18 years earlier. She had lower back pain and occasional sciatica since then. Typical symptoms of a narrow spinal canal appeared regularly after the patient started mountain walking five years earlier. Contrast material was injected through a catheter placed in the left external iliac vein. The upper images display an oblique projection. The mask image (right) shows contrast in the external iliac vein and complete occlusion of the common iliac vein at its undercrossing of the right common iliac artery. The left panel displays a later subtracted image by which dilated veins in the spinal canal that arise from the collateral circulation are shown. The lower images are taken from the anterior-posterior projection. The right scan shows the network of the collateral circulation. The pair of distended veins in the spinal canal takes part in the drainage pathway. The left image shows the situation immediately after the reopening of the common iliac vein by means of a Wallstent. The collateral circulation has disappeared. The patient was free of symptoms immediately.

Table I. Demographic data of patients with chronic postthrombotic pelvic venous obstruction

Patients	39 women, 3 men
	Mean age: 48.8 years (range, 22 to 75)
	Mean time elapsed since acute occlusion: 18.2 years (range, 1.7 to 46)
Localization	38 left, 1 right, 3 bilateral pelvic veins
Concomitant postthrombotic syndrome of leg	23 patients (54%)

Table II. Symptoms of chronic postthrombotic pelvic venous obstruction induced by physical exertion

	Venous claudication	*Neurogenic claudication caused by distended veins in the spinal canal*
Quality of pain	Sensation of bursting, cramping	Radiating weakness, numbness
Localization	Thigh or whole affected leg	Lower back, buttocks, and both legs
Beginning	Slow and late	Late, but sudden
Relief	Slow; accelerated by leg elevation	Very slow; leg elevation and spinal movements not helpful

Table III. Symptoms of patients with chronic postthrombotic pelvic venous obstruction

	Patients	*%*
Number of patients studied	42	100
Complaints at presentation		
Varicose disease	16	38
Symptoms of CVI	16	38
Typical symptoms of CPPVO	10	24
Typical symptoms of CPPVO unmasked by means of specific inquiry	20	47
Total number of patients with typical symptoms of CPPVO	30	71

CVI, Chronic venous insufficiency; *CPPVO,* chronic postthrombotic pelvic venous obstruction.

Table IV. Technical and clinical results of stenting of chronic postthrombotic pelvic venous obstruction

	Number of patients
Stenting attempted	14
Stents patent after 1 week (2 primary failures, 1 early reocclusion)	11 (79%)
Stents patent after a mean of 15 months (range, 1 to 43)	11 (79%)

ulation therapy. This patient had the shortest history of CPPVO (20 months).

At follow-up, all stents were revealed to be patent by means of duplex scanning. There were no morphologic or functional signs of restenosis in any case. The anatomic results are summarized in Table IV. Major improvement of symptoms was achieved in nine patients. One patient with neurogenic claudication and another with venous claudication reported complete relief. The two patients whose pelvic veins were stented despite a lack of typical symptoms had almost no benefit. The results of symptom evaluation with visual analog scales are shown in Fig 3.

DISCUSSION

The presence of a venous spur as the underlying pathology of pelvic vein thrombosis has been described by May and Thuner[4] and was later termed "iliac vein compression syndrome" by Cockett et al.[5] The left CIV is compressed against the vertebral column by the crossing right iliac artery. As a consequence of compression and perpetual pulsation, morphologic changes develop and narrow the lumen. Acute thrombosis can occur, involving the whole leg in every other patient. Malformations of the iliocaval system may also lead to pelvic vein obstruction and the same late sequels.[6]

CPPVO causes typical clinical symptoms in two thirds of patients, according to this series. Venous claudication is a well-known symptom.[7,8] The syndrome of a narrow spinal canal caused by dilated veins that arise from the collateral circulation was described 10 years ago,[1] but is not recognized as a typical symptom yet. However, the pathophysiology of both clinical syndromes seems conspicuous. During strenuous physical exertion, blood flow to the legs increases and so does venous return. Pelvic venous obstruction impedes rapid drainage and causes painful congestion of the muscles. In addition, the greatly augmented blood volume leads to distension of the collaterals. If collateral veins extend through the spinal canal, they occupy space and compress nerves. The typical symptoms of a narrow spinal canal ensue.

In contrast to what happens when cord or root compression is caused by osteoarthrosis or discoidal herniation, the symptoms are not relieved with

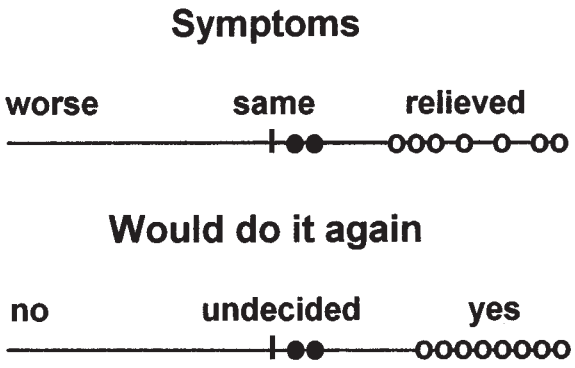

Fig 3. Satisfaction of patients with chronic postthrombotic pelvic venous obstruction treated with endoluminal stents. Ten (of 11) patients with patent stents at follow-up were asked to rate the symptoms they still had in comparison with what they felt before placement of the stent and to state whether they would undergo the procedure again. Bidirectional visual analog scales were used. The markings of patients with typical symptoms before stenting are shown with open symbols; the markings of patients lacking such typical symptoms are shown with closed symbols.

movements of the vertebral column and they last quite a long time. Leg elevation alleviates the bursting sensation of venous claudication, but not the symptoms of the narrow spinal canal. In the present study, patients with CPPVO were not systematically examined for the presence of spinal collaterals. Therefore, conclusions on the prevalence, specificity, or sensitivity of the symptoms cannot be drawn. Nevertheless, consideration of the clinical syndrome will lead clinicians to take a targeted history that may have therapeutic consequences. According to the experience obtained from this small series, symptoms regarded as typical of CPPVO can be relieved with the straightforward placement of an endovenous stent.

The stenting procedure itself requires some discussion. First, it is surprising that venous occlusions of such an old age could be overcome. We believe that this is a specific feature of May-Thuner's syndrome. Small channels have been described within the original lumen and the wall of the occluded CIV.[9] The thin gel-coated guide wire may have found its way through such channels. More distal occlusions did not allow the passage of a catheter. Second, it is noteworthy that the stents did not thrombose more frequently. We believe that this has to do with both the nature of the occlusion (which is more fibrous than thrombotic) and its age. Proneness to rethrombosis may result from thrombin that is contained within the fibrin thrombus[10] and liberated during dilatation.[11] For the reasons cited, this may not be the case in chronic May-Thuner's syndrome. Third, it is interesting to see that neither restenosis nor late thrombosis occurred, although anticoagulant treatment had been stopped in half of the patients many months before their follow-up examination. At the moment, we can only acknowledge the phenomenon.

In summary, this report intends to make clinicians aware of the existence of typical symptoms in patients with CPPVO and that these symptoms may be relieved with the deployment of an endovenous stent. Stenting of the CIV seems easier to perform and to have a better patency rate than expected.

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Submitted April 1, 1998; accepted Sep 2, 1998.